4-3 Congruent Triangles

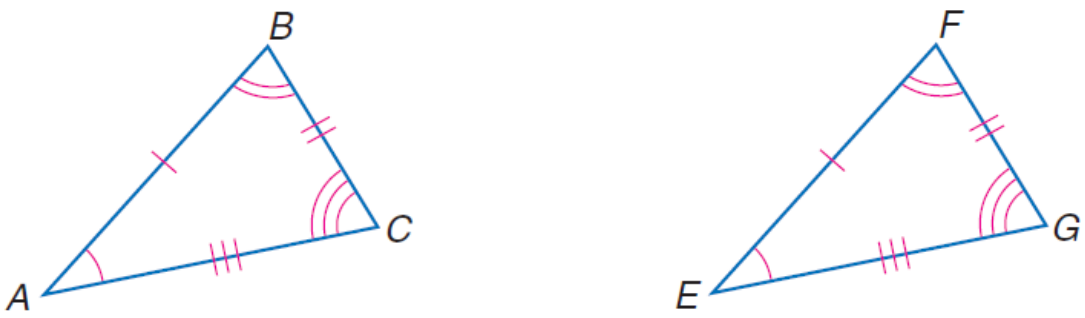
Main Ideas

- Name and label corresponding parts of congruent triangles
- Identify congruence transformations

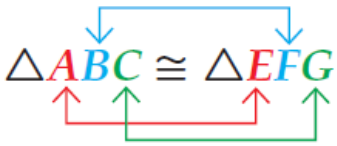
New Vocabulary

- congruent triangles
- congruence transformations

Corresponding Parts of Congruent Triangles Triangles that are the same size and shape are **congruent triangles**. Each triangle has three angles and three sides. If all six of the corresponding parts of two triangles are congruent, then the triangles are congruent.



If $\triangle ABC$ is congruent to $\triangle EFG$, the vertices of the two triangles correspond in the same order as the letters naming the triangles.



This correspondence of vertices can be used to name the corresponding congruent sides and angles of the two triangles.

$\angle A \cong \angle E$ $\angle B \cong \angle F$ $\angle C \cong \angle G$

$\overline{AB} \cong \overline{EF}$ $\overline{BC} \cong \overline{FG}$ $\overline{AC} \cong \overline{EG}$

The corresponding sides and angles can be determined from any congruence statement by following the order of the letters.

CPCTC - Corresponding Parts of Congruent Triangles are Congruent

"Two triangles are congruent if and only if their corresponding parts are congruent."

The measures of the sides of triangles PDQ and OEC are $PD = 5$, $DQ = 7$, $PQ = 11$; $EC = 7$, $OC = 5$, and $OE = 11$.

1A. Name the corresponding congruent angles and sides.

1B. Name the congruent triangles.

Properties of Triangle Congruence

Congruence of triangles is reflexive, symmetric, and transitive.

Reflexive

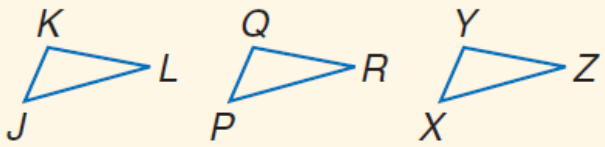
$\triangle JKL \cong \triangle JKL$

Symmetric

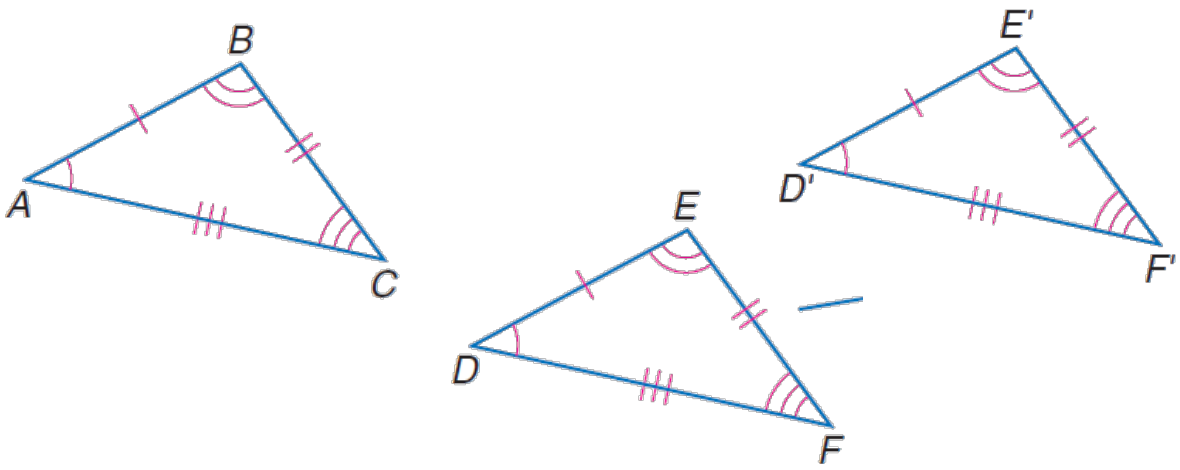
If $\triangle JKL \cong \triangle PQR$, then $\triangle PQR \cong \triangle JKL$.

Transitive

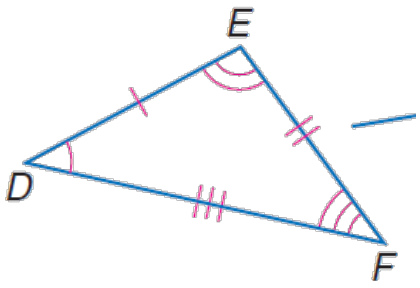
If $\triangle JKL \cong \triangle PQR$, and $\triangle PQR \cong \triangle XYZ$, then $\triangle JKL \cong \triangle XYZ$.



Identify Congruence Transformations In the figures below, $\triangle ABC$ is congruent to $\triangle DEF$. If you slide, or translate, $\triangle DEF$ up and to the right, $\triangle DEF$ is still congruent to $\triangle ABC$.



The congruency does not change whether you *turn*, or *rotate*, $\triangle DEF$ or *flip*, or *reflect*, $\triangle DEF$. $\triangle ABC$ is still congruent to $\triangle DEF$.



If you slide, flip, or turn a triangle, the size and shape do not change. These three transformations are called **congruence transformations**.

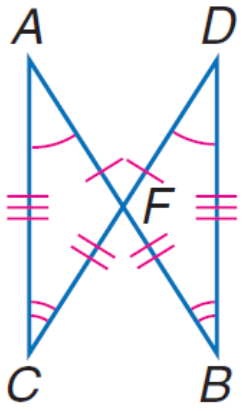
COORDINATE GEOMETRY **The vertices of $\triangle CDE$ are $C(-5, 7)$, $D(-8, 6)$, and $E(-3, 3)$. The vertices of $\triangle C'D'E'$ are $C'(5, 7)$, $D'(8, 6)$, and $E'(3, 3)$.**

a. Verify that $\triangle CDE \cong \triangle C'D'E'$.

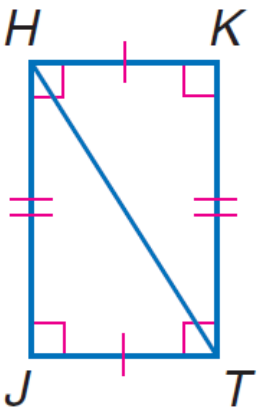
Use the Distance Formula to find the length of each side in the triangles.

Identify the corresponding congruent angles and sides and the congruent triangles in each figure.

1.



2.



Name the congruent angles and sides for each pair of congruent triangles.

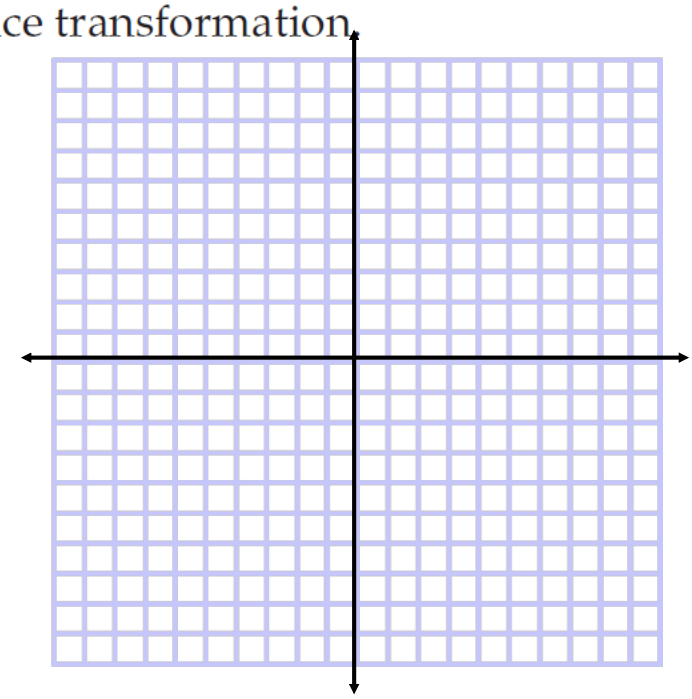
14. $\triangle TUV \cong \triangle XYZ$

15. $\triangle CDG \cong \triangle RSW$

16. $\triangle BCF \cong \triangle DGH$

17. $\triangle ADG \cong \triangle HKL$

The vertices of $\triangle SUV$ and $\triangle S'U'V'$ are $S(0, 4)$, $U(0, 0)$, $V(2, 2)$, $S'(0, -4)$, $U'(0, 0)$, and $V'(-2, -2)$. Verify that the triangles are congruent and then name the congruence transformation.



The vertices of $\triangle QRT$ and $\triangle Q'R'T'$ are $Q(-4, 3)$, $Q'(4, 3)$, $R(-4, -2)$, $R'(4, -2)$, $T(-1, -2)$, and $T'(1, -2)$. Verify that $\triangle QRT \cong \triangle Q'R'T'$. Then name the congruence transformation.